Fig. 1

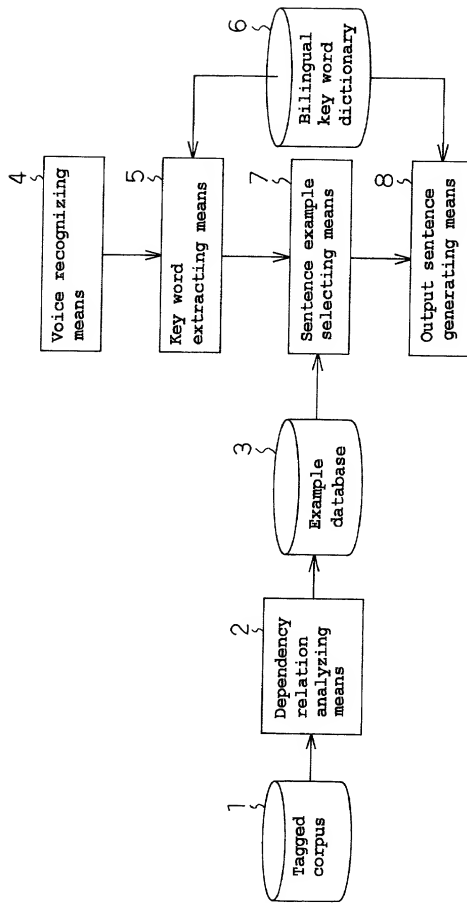# Fig. 2 (a)

Example of bilingual key word dictionary

```
kohi [コーヒー]    : coffee
onegai [お願い]    : *
miruku [ミルク]    : milk
tsumetai [冷たい]  : cold
ari [あり]         : *
```

Example of example DB

```
    Dependency relation                           : Expression pattern

(kohi [コーヒー]→onegai [お願い])                  : I'd like to coffee please.

(tsumetai [冷たい]→miruku [ミルク]) (miruku [ミルク]→ari [あり]): Do you have a cold milk ?

        . . .
```

Fig. 2 (b)

Example of tagged corpus

```
Kohi (common noun)| o (kaku-postpositional particle)| o (prefix)| negai (sahen-noun)| shi (verb)|
masu (auxiliary verb)
[コーヒー (一般名詞) | を (格助詞) | お (接頭詞) | 願い (サ変名詞) | し (動詞) | ます (助動詞) ]


Tsumetai (adjective)| miruku (common noun)| ha (kei-postpositional particle)| ari (verb)| masu
(auxiliary verb)| ka (shu-postpositional particle) …
[冷たい (形容詞) | ミルク (普通名詞) | は (係助詞) | あり (動詞) | ます (助動詞) | か (終助詞) ]
        . . .
```

Fig. 3

Example of example DB

Dependency relation   : Expression pattern

(kohi [コーヒー]→onegai [お願い])   : Coffee please.

(tsumetai [冷たい]→miruku [ミルク]) (miruku [ミルク]→ari [あり])   : Any cold milk?

. . .

Fig. 4

Tagged corpus — 1

Dependency relation analyzing means — 2

Classified vocabulary table — 12

Word classing means — 13

Example database — 11

Voice recognizing means — 4

Key word extracting means — 5

Sentence example selecting means — 14

Output sentence generating means — 15

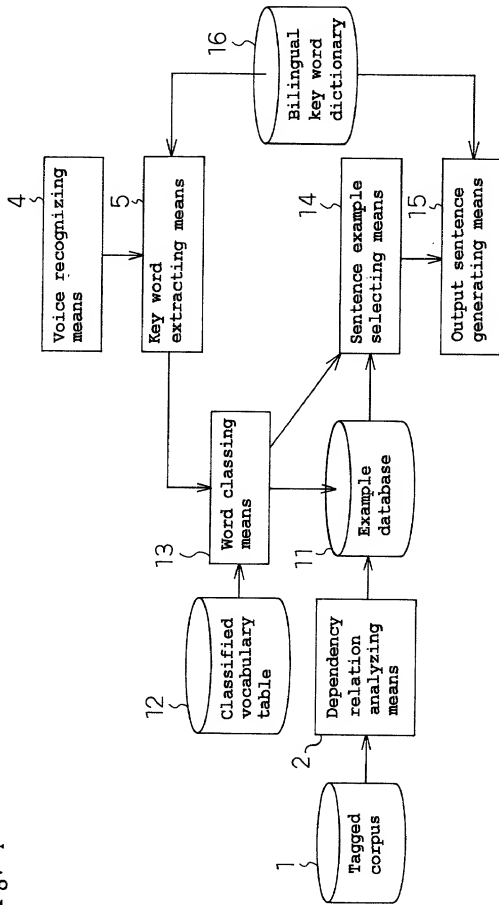Bilingual key word dictionary — 16

Fig. 5 (a)

Classified vocabulary table

kohi [コーヒー] (common noun [一般名詞])　100
miruku [ミルク] (common noun [一般名詞])　100
koucha [紅茶]　(common noun [一般名詞])　100
...
tsumetai [冷たい] (adjective [形容詞])　200
atsui [熱い]　(adjective [形容詞])　200
...

Fig. 5 (b)

Example of example DB

Key word	: Dependency relation	: Sentence example
① 100 ② onegai [お願い]	: (①→②)	: I'd like to ② please.
① 200 ② 100 ③ ari [あり]	: (①→②) (②→③)	: Do you have a ① ② ?
...		

Fig. 6

Fig. 6 block diagram:

1 — Tagged corpus → 2 — Dependency relation analyzing means → 3 — Example database → 21 — Sentence example selecting means

4 — Voice recognizing means → 5 — Key word extracting means → Sentence example selecting means

6 — Bilingual key word dictionary → Key word extracting means / Sentence example selecting means

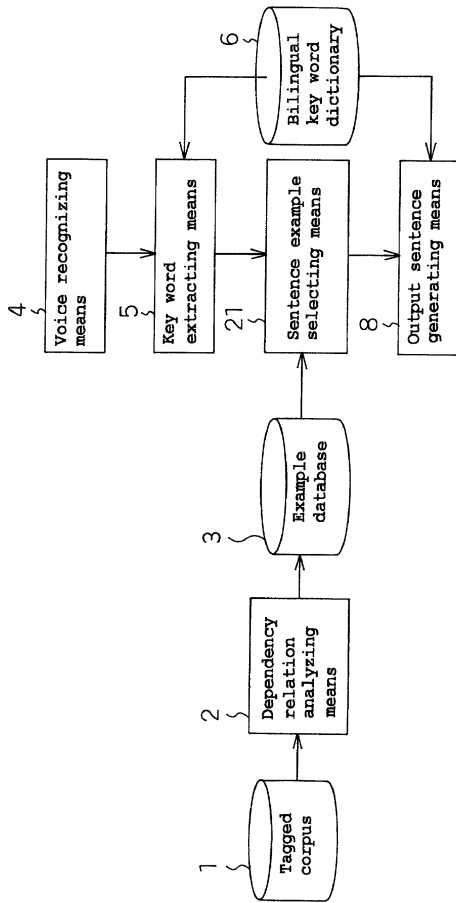8 — Output sentence generating means

Fig. 7

Input sentence   : Atsui miruku ha arimasuka [熱いミルクはありますか]

Recognition result sentence : Aoi miruku ha arimasuka [青いミルクはありますか]

Example of example DB

Dependency relation	Sentence example
(kohi [コーヒー]→onegai [お願い])	Coffee please.
(atsui [熱い]→miruku [ミルク]) (miruku [ミルク]→ari [あり])	Any hot milk ?
・ ・ ・	

Extracted key words : aoi [青い], miruku [ミルク], ari [あり]

Result of dependency relation comparison between the key words and example DB :

(aoi [青い], miruku [ミルク]) ✕

(aoi [青い], ari [あり]) ✕
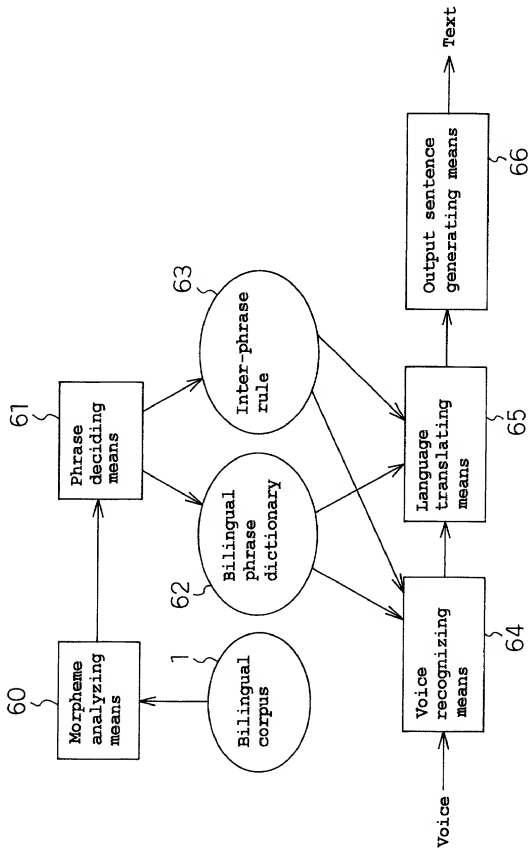
(miruku [ミルク], ari [あり]) ◯

Fig. 8

Fig. 9-1(a)

~70 Bilingual voiced sentence example

Heya no yoyaku o onegai shitain desuga
[部屋の予約をお願いしたいんですが]

I'd like to reserve a room.

Fig. 9-1(b)

⎰71 Bilingual phrase (A)

⎰72 Bilingual phrase (B)

heya no yoyaku
[部屋の予約]

(reserve a room)

onegai shitain desuga
[お願いしたいんですが]

(I'd like to)

Fig. 9-1(c)

～62 Bilingual phrase
dictionary

Japanese	English
X no Y [X の Y]	↔ (YX)
Z shitain desuga [Z したいんですが]	↔(I'd like to)

Fig. 9-2 (d)

~63 Inter-phrase rule

Japanese	English
(A) o (B) suru [(A)を(B) する]	↔ ((B) to (A))

Fig. 9-2 (e)

~64
Classified vocabulary
table

X (heya [部屋], kaigishitsu [会議室], kuruma [車], ⋯)
Y (yoyaku [予約], keiyaku [契約], ⋯)
Z (onegai [お願い], tanomu [たのむ], ⋯)
    ⋯

Fig. 10 (a)

Example of bilingual key word dictionary

```
coffee  :  kohi[コーヒー]
please  :  onegai[お願い]
milk    :  miruku[ミルク]
cold    :  tsumetai[冷たい]
have    :  ari[あり]
```

Example of example DB

Dependency relation	Expression pattern
(coffee→please)	: Kohi o onegai shimasu [コーヒーをお願いします]
(cold→milk) (milk→have)	: Tsumetai miruku ha arimasuka [冷たいミルクはありますか]
...	

Fig. 10 (b)

Example of tagged corpus

I(pronoun)|I'd(auxiliary verb)|like(verb)|to(determiner)|coffee(common noun)|
please(adverb)|

...

Fig. 11 (a)

Classified vocabulary table

```
coffee (common noun) 100
milk   (common noun) 100
tea    (common noun) 100
  ...
cold   (adjective)   200
hot    (adjective)   200
  ...
```

Fig. 11 (b)

Example of example DB

Key word	: Dependency relation	: Sentence example
① 100 ② please	: ① o [を] ② shimasu [します]	: ① o [を] ② shimasu [します]
① 200 ② 100 ③ have : (①→②) (②→③)		: ①② ha [は] ③ masuka [ますか]
...		

Fig. 12

Input sentence   : Do you have a hot milk ?

Recognition result sentence : Do you have a head milk ?

Example of example DB

Dependency relation   : Sentence example

(coffee→please)   : Kohi o onegai shimasu [コーヒーをお願いします]

(hot→milk) (milk→have) : Atsui miruku ha arimasuka [熱いミルクはありますか]

          ...

Extracted key words : (have, head, milk)

Result of dependency relation comparison between the key words and example DB :

   (head, milk)   ×

   (head, have)   ×

   (milk, have)   ○

Fig. 13 (a)

Example of bilingual key word dictionary

咖啡　：kohi [コーヒー]
要　　：kudasai [下さい]
日文　：nihongo [日本語]
菜単　：menyu [メニュー]
有　　：ari [あり]

Example of example DB

Dependency relation	: Expression pattern
（咖啡→要　）	: Kohi o kudasai [コーヒーを下さい]
（日文→菜単）（菜単→有　）	: Nihongo no menyu ha arimasuka [日本語のメニューはありますか]
⋯	

Fig. 13 (b)

Example of tagged corpus

要（動）| 咖啡（名同）|

⋯

Fig. 14 (a)

Classified vocabulary table

咖啡	(名)	100
牛奶	(名)	100
红茶	(名)	100
冷	(形)	200
热	(形)	200
日文	(名)	300
菜单	(名)	400
...		

Fig. 14 (b)

Example of example DB

Key word	: Dependency relation	: Sentence example
① 100　② 要	:(①→②)	: ① o [を] ②
① 300　② 400　③ 有	:((①→②) (②→③)	: ① no [の] ② ha [は] ③ masuka [ますか]
	...	

Fig. 15

Input sentence   : 有日文菜単吗

Recognition result sentence : 有日没菜単吗

Example of example DB

Dependency relation	: Sentence example
(咖啡→要)	: Kohi o kudasai [コーヒーを下さい]
(日文→菜単) (菜単→有)	: Nihongo no menyu ha arimasuka [日本語のメニューはありますか]
	...

Extracted key words : (有、日没、菜単)

Result of dependency relation comparison between the key words and example DB :

    (日没, 有) ×

    (日没, 菜単) ×

    (菜単, 有) ○